



## **Derivation of extreme event mesoscale area-intensity return periods of rainfall based on a large sample of radar data**

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The time-space resolution of weather radar measurements is typically better than that of a gauge network by a factor of  $10^6$ . Thus radar measurements provide very large samples of local precipitation climates containing rare extreme cases. We present return periods of rainfall at point and in areas of  $1 \text{ km}^2$ ,  $9 \text{ km}^2$ ,  $100 \text{ km}^2$  and  $1024 \text{ km}^2$  where the length of accumulation period varies from 1 min to 24 h. The data set covers at least 60 billion bin values from 7 Finnish C-band Doppler weather radars. It is shown that without a careful post detection quality control removing the effects of system calibration, residual clutter and hail “usual” Doppler filtered radar data will not give reliable statistics. It is also shown that the use of typical extreme event distributions does not work but return periods must be calculated applying the probability distribution of all data.